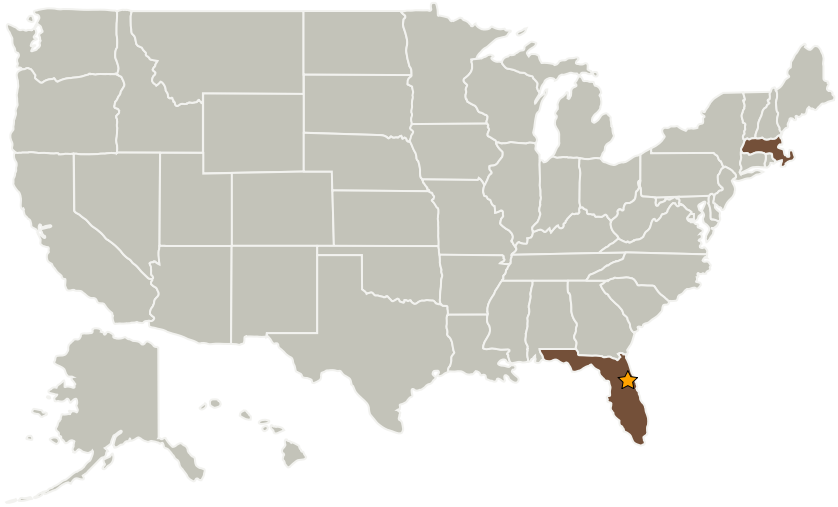
# Lightweight Non-Compacting Aerogel Insulation for Cryotanks, Phase I

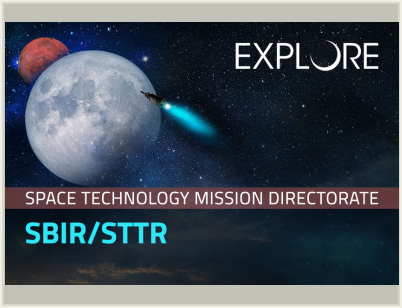
Completed Technology Project (2009 - 2009)

## Project Introduction

The exploration of space requires that new technologies be developed for long-term cryogenic propellant storage applications in-space, on the lunar surface, and on the Earth. The Altair ascent stage requires LO2 and LCH4 storage durations of up to 14 days in LEO and up to an additional 210 days on the lunar surface. Long term storage (224 days) of LO2 cryogenic propellant on the lunar surface is required to support space power systems, spaceports, spacesuits, lunar habitation systems, robotics, and in situ propellant systems. Long term storage (6 months) of LO2/ LH2/ LCH4 cryogenic propellants in 1-g on the surface of the Earth with minimal propellant loss is required to support launch site ground operations. Thus, this proposed project will focus on improving the strength of aerogels, which are the lightest weight and best cryogenic insulation material known. Improvements in the strength of aerogels would allow these materials to be used as advanced non-compacting insulation materials capable of retaining structural integrity while accommodating large operating temperatures ranging from cryogenic to elevated temperatures. The properties of the aerogels will be tailored by controlling their densities and strengthened by reinforcing them with fibers and with organic polymer crosslinking agents.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Kennedy Space Center (KSC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Kennedy Space Center(KSC) | Lead Organization | NASA Center | Kennedy Space Center, Florida |
| Aspen Aerogels, Inc. | Supporting Organization | Industry | Northborough, Massachusetts |

| Primary U.S. Work Locations | |
|---|---|
| Florida | Massachusetts |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.1 In-space Propellant Storage & Utilization